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BOSTON

*Reprinted from the Boston Medical and Surgical Journal of
December 15, 1898*

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BOSTON

DAMRELL & UPHAM, PUBLISHERS

No. 283 WASHINGTON STREET

1898

[Reprinted from the Boston Medical and Surgical Journal of December 15, 1898.]

MALARIA AS SEEN AT MONTAUK.

BY F. J. COTTON, M.D., BOSTON.

IN considering the types of malaria seen in the hospital at Camp Wikoff it may be well to note that all the many cases there had one point in common — one point of difference from any ordinary series of malarial infections — they were all old cases; almost without exception the fever had been contracted in the vicinity of Santiago.

This fact probably explains why the remittent malarial fevers were so few, and why the course of the disease was so inconstant.

It was curiously difficult to get accurate histories from the men: they were usually as laconic on the subject of illness as on that of fighting. It was, therefore, hard to get the precise data, but while a few cases started as early as July 7th or 8th, the majority of the men seem to have taken their infection seriously only after the strain and excitement were over, — from July 14th on, and many were actually well up to this time. Of those at Montauk who had malaria at all, few had remained well through July; a great majority dated their first attack as early as the 20th.

Most of them had had two or more attacks in Cuba, usually lasting but a few days, and recurring at varying intervals from a week upward. In some cases there was a pretty clear history of a longer continued remittent malaria, with or without subsequent attacks. The patients had nearly all had quinine often in heavy

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doses, but very few had been regular or persistent in its use.

The majority of cases were of course convalescents, often suffering more from exhaustion and privation than from the effects of the malaria. They were emaciated, weak and anemic, many complaining especially of lame back and legs, loss of appetite, or dizziness, but with a few days of rest, food, quinine and iron they picked up rapidly, and were soon clamoring for furloughs.

Some few cases were so intensely anemic as to be in really serious condition, and required longer treatment for the anemia. Many had diarrheas, whether specifically malarial or simply camp diarrhea it was usually impossible to say; others had dysentery, some of them, at least, from amoebæ.¹ The physical examination of these convalescents showed frequent functional heart murmurs, occasionally with slight dilatation, and sometimes an enlarged spleen, rarely, however, of any great size. They were apt to show slight irregularities of temperature, of no fixed type. The blood examination showed a varying grade of secondary anemia, occasionally some pigment, but no plasmodia.

Some few cases, however, apparently convalescent and otherwise not notable, did have parasites in the blood, for example:

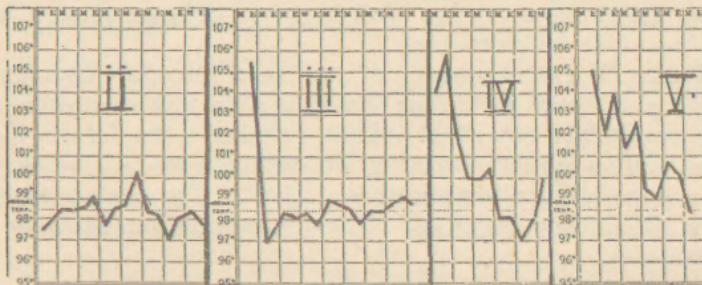
CASE I. Began in July with chills and fever. After much quinine, the fever became irregular and abated. He had a second attack, of short duration. A week ago two or three chills. On entrance, nothing of note beyond a moderate anemia; felt as well as at any time since July. While in the ward no temperature worth mentioning, no chills. The blood showed chloranemia, pigmented leucocytes, a few crescentic bodies.

¹ Amoebæ dysenteriae were found in the stools of a number of cases in the hospital, but most of the presumably amoebic cases were convalescent when first seen.

CASE II. Had irregular chills and fever in Cuba for four weeks; since then on his feet, but not on duty. Now feeling better. Emaciated, but without much pallor. No chills or fever; no symptoms except occasional nausea and palpitation. The blood showed slight anemia; a few crescents and some younger forms (intracellular rings).

These cases are probably rather cases of chronic than of recurrent infection. None of the cases of this sort showed other than the estivo-autumnal form of parasite.

In many instances patients previously convalescent developed active symptoms of malaria as a result of



privation, of sea-sickness, or of digestive disturbance on the transports, or as a result of the over-exertion of landing or pitching camp. They came in complaining of chills and fever, or only of headache and backache, or perhaps dizziness. They were apt to show curious temperature charts, usually without any approach to a fixed type, and were notable only in that they usually improved very rapidly under treatment. Such cases were frequent enough to demonstrate definitely the connection of the attack with depressing influences, especially physical over-exertion. In a very few of these cases the tertian parasite was found, more often

the estivo-autumnal, while in some, curiously enough, the blood examination showed only anemia and pigmented leucocytes, without any plasmodia. The cases without parasites were in every way comparable with those where they were present,—in the negative physical examination, in symptoms and in course. Whether they represent the reaction to exhaustion of a malarial cachexia without active organisms, or were simply infections in which the plasmodia were in the viscera only, is hard to say. Actual proof seems impossible, for such cases do not, of course, come to autopsy.

CASE III (see chart) is an example of the first class. The blood report was: Considerable chloranemia, a few intracellular "signet-rings."

CASE IV gave a history of two or three short attacks of chills and fever in Cuba; since then in fair condition till the day before entrance. That evening a moderate diarrhea and a chill. On day of entrance no diarrhea; in afternoon chilly; temperature 105.8°. Physical examination absolutely negative. Blood examination showed no plasmodia.

Apart from this class of cases, the malarias simply recurred after an indefinite interval from the last seizure. Almost all the described types of attack were seen. The great majority had estivo-autumnal infection; tertian infection was not infrequent; true quartan fever was not seen. Those patients who showed the tertian parasite were from the same regiments as those with the estivo-autumnal, and, so far as could be made out, had had similar exposure. There were very few cases, however, when the two parasites occurred in the same case. The pure tertian infections² were both single and double, the double

² That is, those due to the "mild tertian" parasite; no distinction of the so-called "malignant tertian" variety of the estivo-autumnal parasite was attempted.

infection with daily chills being rather more common. Occasional cases without chills were seen.

CASE V. Never had chills in previous attacks in Cuba, nor did he have any while in the ward. The blood examination showed many fully-developed tertian organisms.

It is noteworthy that nearly all the really large spleens seen belonged to these long-continued tertian cases, and that many of them showed an anemia much more intense than was usual with the estivo-autumnal cases.

Two cases, both tertian, were brought into the wards one very hot day (September 1st) as sun-stroke cases. In both cases it seemed as if the effect of the heat had been added to that of a malarial infection already running.

One of these cases was really only a heat prostration on top of a tertian attack that had been in full course for a week; the temperature was 106°, but he showed none of the signs of true insolation.

The other case (Case VI) imitated more closely a simple sunstroke. He was found unconscious outside the camp and brought in semi-comatose, livid, with a temperature of 106°, a pulse of 110. An iced bath restored him to consciousness, and brought the temperature to 103°. From this time on the case was one of ordinary double tertian malaria, and the day after the "sunstroke" full-grown tertian organisms were found in the blood. He gave a history of four or five attacks with chills in Cuba, was ill on the transport, and had been ailing for three or four days, but was on his way to report for a furlough when he collapsed in the heat.

The estivo-autumnal recurrents which formed the bulk of all the cases were almost hopelessly inconstant in type. There were cases practically without fever, without symptoms (Cases I and II). Other cases had

only an irregular temperature as evidence of infection. The majority, however, had chills, often severe, usually very irregular, not infrequently appearing in one paroxysm, absent the next. The length of the chill and the duration of the temperature varied indefinitely. The same may be said of the recurrence of the paroxysms; the only approach to regularity was in those cases with a daily chill, and even in these there was no regular hour of onset. The duration of the attack in these cases was usually not over four days, the interval between attacks inconstant, with a tendency to recur after about eight days.

Occasionally attacks of headache and backache or nausea replaced the ordinary form of paroxysm; not infrequently a paroxysm indicated by a considerable rise of temperature would pass entirely unnoticed by the patient, or the initial chill occurred without any subsequent sensation of fever. This happened even with temperatures of 105° or 106° ; with less grades of fever, lack of subjective feeling of heat seemed the rule rather than the exception.

There were a few cases of collapse in the paroxysm. In these cases the collapse was not readily explainable either on account of exceptional weakness of the patient, or of exceptional severity in the general course of the infection, so far as one might judge.

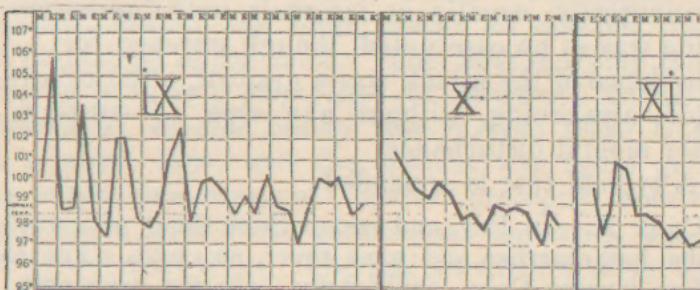
CASE VIII went into profound collapse in the sweating stage of a paroxysm, and could be brought around only by very considerable subcutaneous stimulation with strychnine and whiskey. His blood a couple of hours later showed only a very few small, intracorporeal rings and one older intracellular form. He had no further paroxysms, and five days later applied for a furlough, in very fair condition.

CASE IX, already exhausted from a long-continued dysentery, collapsed in a paroxysm the day of entrance (he had had no sign of malaria for weeks before). His pulse

ran to 160, weak and running; the temperature was 105.8° . He, too, responded to strychnine, whiskey and digitalis, and had no repetition of the collapse. The blood examination on two occasions showed nothing more than a few crescents in the circulating blood.

Some thirty hours after a chill with collapse, began to have another chill, but lapsed into a coma which lasted about three hours, with a temperature of 102° to 103.5° . Quinine was given (ten grains) subcutaneously, but the recovery of consciousness was too prompt to be attributed to the quinine, and apparently was spontaneous.

Cases of coma were not uncommon; some were brought in in this condition, others quietly went into coma in the ward in spite of ordinary quinine dosage.



The coma seems, sometimes at least, to develop as the equivalent of a paroxysm. In one case³ in the hospital each paroxysm brought a short period of coma, which passed away spontaneously.

In some of the cases of coma there was a history of recent chills, or of a chill ushering in the coma, as in the last case, but two cases had had no chills at any time, and one had no clear history of any malarial attacks at all, though crescents were found in his blood.

In all, eight cases of coma came under my personal observation, all closely similar in appearance. The

³ Under the care of Dr. Seabury W. Allen.

patients lay quite still with the limbs quiet (in contrast to the restless, wandering "picking" of typhoids brought in in a not dissimilar coma); there were no muscular twitchings,⁴ no pareses, no loss of muscular tonus. The breathing was regular, in some cases perfectly quiet, in others deep and somewhat stertorous; the pulse, at least in the early stages, not rapid, regular and of good quality. The eyes were partly or fully open, motionless or nearly so, the pupils approximately normal and reacting to light. The patient could often be roused to give his name, perhaps his regiment,—rarely more. A prick of a pin was always responded to, often in lively fashion; the usual reflexes showed nothing abnormal. Rectum and bladder were emptied involuntarily, usually at intervals only; retention of urine was in no case noted, though watched for. The subsidence of the attack was a gradual, often relatively rapid, awakening, without any sign of delirium or other mental disturbance.

A typical case is appended:

CASE X. In July, and two or three times afterward in Cuba, had diarrhea and some fever, no chills. The week before leaving Cuba, chills daily. On the transport, six chills; then better. On landing, one chill; then irregular fever. On day of entrance had a chill. Brought in semicomatose, supposed to be moribund. Pulse was poor, but responded to stimulation. Temperature 101°; some sweating. Rallied through the night and by morning was in fair condition, quiet and fully conscious. Blood taken during coma showed only crescents and intense anemia. Recovery uneventful. No chills while in the ward.

The next case is atypical only in the occurrence of convulsions.

CASE XI. No clear history of malaria to be obtained at any time, despite repeated questioning. Had suffered much

⁴ In one case, however, there was a persistent champing of the jaws, without other muscular action.

from the heat, however. Four days before, while on the transport, he had been ill, but recollects neither chills nor fever. After landing he recalls only that he was "played out altogether."

He was brought in in coma; resisted examination, but could not be roused to give his name; was able to swallow. Quinine given, 15 grains every four hours. Lay with eyes open; perfectly quiet save when touched. The pulse was of good quality and not rapid. Examination of the blood showed a good many crescents, a few intracellular rings, little pigment. The coma continued through the day; toward evening the pulse was less good, and strychnine was given, one-sixtieth grain every four hours. The pulse rallied, but, despite the large dosage of quinine, there was no change in the coma. The next morning there occurred a tetanic convulsion of moderate intensity, followed by several others less severe; these lasted but a short time, and the patient was again quiet. The strychnine was, of course, promptly omitted. Eight hours later fresh convulsions appeared, but of wholly different type. The patient writhed about in a quite irregular fashion, with all muscles tense, but with wild gyrations of arms and legs. There were no clonic contractions. The eyes, throughout the half hour that the attack lasted, deviated to the right, and the head was rigidly retracted and turned to the right. This attack passed off without doing obvious harm, but without change in the coma. Quinine was next given subcutaneously in 10-grain dose without obvious effect. In the evening a subcutaneous injection of salt solution was given, in the amount of one litre. Not long after this the patient began to improve. Next morning, some sixty hours after entrance, he woke to full consciousness. For a day longer there was a trace left of the retraction of the head, and the

neck and upper back were stiff and somewhat tender. This, however, passed off, and two days later he was up and apparently well. There were no further paroxysms.

It is possible that the first convulsions were due to strychnine, though the total given was but one-fifteenth of a grain, but the second set would seem to have been due, probably, to the malarial infection.

In regard to these coma cases, it may be said that administration of quinine by mouth, even when the patient can swallow readily, seems of little use, while the subcutaneous injection of the soluble salts of quinine seemed of definite effect in the majority of cases. Subcutaneous injection of salt solution seemed, in the few cases where it was tried, to have some value.

There were relatively very few cases of continued malarial fevers. One patient ran a temperature of $100\text{--}102\frac{1}{2}^{\circ}$, and lay in a typical typhoid condition for days. He had no abdominal symptoms beyond a slight diarrhea. Rose spots were absent; the spleen was moderately enlarged; he had one attack of epistaxis. The only thing of note was an intense anemia, obviously referable to the previous malarial attacks of which he gave a history. The examination of the blood on two occasions showed no plasmodia, though there was marked anemia and considerable pigment.

This case was called typhoid until, after six days (during which some quinine was given), the temperature abruptly fell from 101° to normal and stayed there. With this change his stupor very suddenly disappeared and within twenty-four hours he seemed, except for the anemia, perfectly well. There was no recurrence of symptoms while he remained in the hospital. In a second case of almost identical course the recovery was less abrupt, but here the plasmodia were found

present in the blood as well as the pigment and chloranemia. Both these cases are apparently malarial; in neither case was the Widal test performed, but clinically there was no reason to assume a mixed infection. In other cases, where the mental condition, the enlarged spleen, moderate abdominal tenderness and the slight bronchitis strongly suggested typhoid, the temperature was really intermittent, the fever of short course, and the estivo-autumnal parasites demonstrated. These cases had no chills.

In a number of cases with irregular fever, where there was a history of malaria, the blood examination showed anemia and pigment but no organisms, while the clinical diagnosis of the typhoid was usually confirmed later by a positive Widal test. Probably in one sense many of these were mixed infections, but during the course of the typhoid there were no plasmodia in the blood, nor did the latent malaria show any influence on the fever curve. In a very few of these cases, during the convalescence, after the normal temperature had been reached, there was a flare-up of temperature, with or without chills, and the plasmodia previously absent reappeared in the blood. Mixed infections, typho-malaria in the stricter sense, where both processes are active at the same time, were not seen in this series of cases.

The above cases are from a total of about three hundred, which were under my care in the General Hospital at Camp Wikoff from the 21st of August till early in October. Of this total, probably two hundred had, or had had, malaria, but many were fully convalescent, while many were in the wards too short a time for close observation. Detailed notes, charts, etc., are at hand for only seventy of the malarial cases; these were, of course, mainly the severer cases.

For the blood examinations cited, for Widal tests, etc., I am indebted to Dr. James Ewing, of New York, whose work as hematologist to the hospital, carried out under considerable difficulties, was of the greatest practical value.

THE BOSTON MEDICAL AND SURGICAL JOURNAL.

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PUBLISHED BY DAMRELL & UPHAM,

283 Washington St., Boston.

